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Integrable evolution equations on spaces of tensor densities

Feride Tiglay *

ftiglay@fields.utoronto.ca

In a pioneering paper V. Arnold presented a general framework within which it is possible to employ geometric and Lie theoretic techniques to study the equations of motion of a rigid body in R^3 and the equations of ideal hydrodynamics. We describe how to extend his formalism and introduce two integrable PDE. One of the equations turns out to be closely related to the inviscid Burgers equation while the other has not been identified in any form before. These two PDE possess certain hallmarks of integrability : the existence of a Lax pair formulation, a bi-Hamiltonian structure, the presence of an infinite family of conserved quantities and the ability to write down explicitly some of its solutions.

*Fields Institute for Research in Mathematical Science 222 College Street, 2nd Floor Toronto, ON M5T 3J1, CANADA.